the Chancellor directed attention to the fact that at present there is in the University no provision for post-graduate training, which, in Japan, can be carried on for five years. The University at present receives immature students, and has been unable to utilise the best of its teaching powers and to train up to the high standard now required to produce leaders of original research and professors in the great departments of knowledge. The institute which the munificence of the late Mr. Tata is providing will afford facilities for post-graduate courses in science, and Sir George Clarke expressed the hope that the University will be able to move in this direction in the future. India, he continued, is crying aloud for science, but in the last years only twenty-five degrees of Bachelor of Science were conferred as compared with 1321 Bachelorships of Arts. The Bombay system is defective in regard to scientific training. The inculcation of scientific ideas does not begin early enough, and cannot be carried far enough, for want of adequately equipped laboratories. In Japan science is taught in the upper primary courses, but does not appear until a much later stage in Bombay, and may almost be said to be confined to the colleges, which cannot all be equipped with the expensive appliances necessary for the training they ought to be able to impart. The attempt to make each college into a complete teaching university must, the Chancellor said, necessarily fail, and concentration, in the case of science training especially, appears to be essential. A beneficent patron of learning could render no better aid to the advancement of science than by providing the University with first-class physical and chemical laboratories. Principal Sharp has pointed out that expenditure on education in India would have to be increased from about four millions stefling to twenty-seven millions .to provide an amount per head equal to that available in Japan.

SOCIETIES AND ACADEMIES.

London.

Royal Society, February 20.—" Notes on the Application of Low Temperatures to some Chemical Problems : (1) Use of Charcoal in Vapour Density Determinations ; (2) Rotatory Power of Organic Substances." By Sir James **Dewar** and Dr. H. O. **Jones.**

(1) In a recent paper (*Phil. Mag.*, 1907, vi., 14, 408) Barkla and Sadler describe the investigation of the penetrating power of secondary Röntgen radiations emitted by different elements, which they find to be dependent on the atomic weight of the elements. The behaviour of nickel could only be reconciled with that of other elements by assigning to it an atomic weight of 61.4, a value considerably higher than the accepted value, 58.7.

Determinations of the vapour density of nickel carbonyl made by the authors (Proc. Roy. Soc., 1903, lxxi., 427) had given no indication that the accepted value for the atomic weight of nickel was too low, but it was considered of interest to make further determinations at low pressures, when the vapour would approximately obey the gas laws.

A new method of manipulation was devised for this purpose depending on the use of charcoal at low temperatures for absorbing gases.

A large flask, the volume of which with the connecting tubes was 2163.2 c.c., was connected to a mercury manometer and exhausted by means of a Fleuss pump followed by charcoal in liquid air. The flask was surrounded by melting ice, and the vapour admitted to any desired pressure. The mass of gas was finally collected in a weighed charcoal reservoir by immersing this in liquid air. Thus the weight of vapour filling the flask at 0° C. under a known pressure was easily determined. The accuracy of the method is dependent on the determination of pressure, since the errors in the other operations are comparatively negligible.

In order to test the method the vapour densities of carbon dioxide, sulphur dioxide, and ether were determined, and the following results (referred to 1 c.c. of hydrogen as 0·00009 gram) show that the method readily

gives results sufficiently accurate for the purpose in hand :—

CO₂		SO₂		Ether	
Press mm.	V.D.	Press mm.	V.D.	Press mm.	V.D.
115·4	21·91	76·1	31·81	31·4	36·90
206·5	21·98	198·5	31·94	63·9	36·91

The theoretical values of these vapour densities are 21.83, 31·79, and 36.76 respectively.

Determinations of the vapour density of nickel carbonyl were then made, with the following results :—

Press mm.	V.D.	Press mm.	V.D.	Press mm.	V.D.
16 6	84·67	41·7	84·69	46·8	84·79

Taking the atomic weight of nickel as 58.3 (H = 1), the theoretical density is 84.73, whereas on the assumption of the atomic weight suggested by Barkla and Sadler, 60.95 (H = 1), the vapour density would be 86.05. These experiments therefore show that it is impossible that the atomic weight of nickel should be as high as 60.95.

The accuracy of the method used could be greatly improved by the use of a larger vessel and more delicate manometric measurement, and if the charcoal condenser was made of metal instead of glass the method might be applied to the more volatile gases.

(2) A preliminary account is given of the results obtained in determining the rotatory power of optically active carbon compounds at low temperatures. Two substances, *l*-nicotine and " bitter orange oil," were selected as suitable for examination, because their solutions in ethyl alcohol could be solidified without losing their transparency, and on account of their high rotatory powers. Up to the present it has only been found possible to make observations down to about −100° C., since below this double refraction interferes with the reading of the polarimeter.

A solution of nicotine (21.2 grams in 100 c.c.) which gave a rotation of −30° at +20° C. gave a rotation of −22° at −120° C.

The relation between temperature and rotatory power is approximately linear, and shows that nicotine behaves below 0° C. just as it does above that temperature. The specific rotatory power at −115° C. is calculated to be −99°, and, assuming the linear relation to hold, would be about −54° at −273° C.

The rotatory power of bitter orange oil increases with diminishing temperature below 0° C. as it does above that temperature.

A 20 per cent. solution in alcohol, which gave a rotation of +18°.5 at +8° C., gave a rotation of +25°.5 at −95° C. The relation between temperature and rotatory power is linear, and the calculated specific rotatory power at −273° C. would be about +156°.

Similar results have been obtained with other substances, and these show that the molecules of optically active carbon compounds would exhibit in all probability considerable rotatory power at the lowest temperatures we can command.

Linnean Society, February 20.—Lieut.-Col. Prain, F.R.S., vice-president, in the chair.—Wild types and species of the tuber-bearing Solanums : A. W. **Sutton.** Many hundreds of attempts were made to fertilise *Solanum Maglia* with the cultivated potato, but only one hybrid seedling resulted, from a cross made in July, 1887, and though cultivated for twenty years it· has shown no superiority to ordinary potatoes. The so-called " *Solanum Commersonii*, Violet," was stated to be a mutation obtained through bud variation from the wild *Solanum Commersonii*, Dunal. In opposition to this claim, many growers assert that it is identical with a German potato, the " Blue Giant," raised by Herr Paulsen. Many wild types of tuber-bearing Solanums have been experimented with during the last few years. All these wild types flower freely, but in every case where a wild type produces fruit it has, with the exception of *Solanum etuberosum*, reproduced itself absolutely pure from seed, whereas all varieties of the cultivated potato which produce seed give rise to the greatest possible variation in the seedlings, none corresponding exactly to the parent. There is also a striking difference in the form of the pollen-grains of the wild types of tuber-bearing Solanums com-

pared with pollen-grains of cultivated potatoes, the former being elliptical and the latter very irregular in form. *Solanum etuberosum* is the only wild type of which the seedlings have not reproduced the typical form, but have, on the other hand, given precisely the same variation in habit of foliage, form, size, and colour of tuber, &c., as is found in the seedlings from the cultivated potato. During the twenty years of cultivation, no plant of *Solanum etuberosum* has ever been noticed as affected by the fungus *Phytophthora infestans*, although during the whole period it has been grown in close association with potatoes which have suffered more or less from it year after year. It is a fact that the potatoes originally introduced into England or into Europe were certainly introduced as cultivated potatoes, and not as wild types, and also that it is at least doubtful whether in Chili, Peru, or elsewhere, any specific type of tuber-bearing Solanum (apart from *Solanum etuberosum*) can be found which will, under cultivation, give plants at all like the potato of commerce.—Life-histories and larval habits of the tiger-beetles (Cicindelidæ): Dr. V. E. **Shelford.** The paper is intended to be followed by a series in which the distribution, variation, effects of environment, and evolution of colour will be considered. Eleven races were studied, and the results detailed from three or four thousand individuals which had been reared to maturity; the detailed account of *Cicindela purpurea* is followed by a comparison of the other races, and the paper concludes with a bibliography.

March 5.—Lieut.-Col. Prain, F.R.S., vice-president, in the chair.—A possible case of mimicry in the common sole: Dr. A. T. **Masterman.** There are two species of weever-fish, *Trachinus draco* and *T. vipera*, both venomous, with the poison concentrated at the spines of the first dorsal fin and the opercular spine. These fishes bury themselves in the sand until only the top of its head, with eyes, mouth, and dorsal fins are above the sand. The dorsal fin is of intense black, and conspicuous amongst the sand when protruded; it has been suggested that this may be regarded as a warning signal to the enemies of these fishes. The right or upper pectoral fin of the common sole (*Solea vulgaris*) is well developed, and the upper half of that fin has a large, deep, black patch. It also has the habit of concealing itself under the sand, and the distribution of the weever-fishes and the common sole is almost the same. In the other species of sole the pectoral fin is smaller, or almost wholly wanting. The suggestion is that the common sole has adopted the habit and coloration of the weever-fishes as a protective measure. —The morphology of Stigmaria and of its appendages in comparison with recent Lycopodiales: Prof. F. E. **Weiss.** The discovery by Binney of an organic connection between Stigmaria and the base of Sigillaria did not settle definitely the morphological value of the stigmarian axis. It might still be regarded either as a large bifurcating root bearing lateral roots or as an underground stem (rhizome), in which case its appendages might be adventitious roots (Scott) or leaves modified to serve absorptive purposes (Solms-Laubach), or possibly both kinds of lateral organs might be present (Renault). Some recent observations have tended to re-open the discussion of the morphology of the appendages, particularly the recognition of peripheral "transfusion" tracheids in the stigmarian appendages and the presence of a parichnos-strand in these organs. But though both have their counterpart in the leaves of the Lepidodendraceæ, the author only sees analogy and not homology in these structures, and believes their presence is due to the physiological requirements of the organs in question. On the whole, it seems likely that these problematical organs are lateral extensions of the protocorm of a primitive member of the Lycopodiales.

Physical Society, February 28.—Dr. C. Chree, F.R.S., president, in the chair.—The contact potential difference determined by means of null solutions: S. W. J. **Smith** and H. **Moss.** When a mercury jet breaks in the surface of an electrolyte there is an E.M.F. between the jet and a still immersed mercury electrode. If the contact p.d. between the still mercury and the solution is π_s, that between the jet and the solution being π_d, the observed E.M.F. is $E_p = \pi_s - \pi_d$. This E.M.F. is found to be equal to the polarising E.M.F., E_m, required to produce the maximum surface-tension between mercury and the electro-lyte. Since $E_m = \pi_s - \pi_m$, where π_m is the p.d. between the Hg and the electrolyte when the surface-tension is a maximum, it follows that $\pi_m = \pi_d$. A solution for which $E_p = 0$ is called by Palmaer a "null solution." He found by trial two solutions for which $E_p = 0$. Although he concluded that $\pi_s = \pi_d = 0$, without special assumptions, the only necessary conclusion is $\pi_s = \pi_d = \pi_m$. The object of this paper is to show that Palmaer's deduction is wrong. If an experimental method can be found of obtaining from any electrolyte MX a solution for which $E_m = 0$, then an indefinite number of null solutions can be obtained. Such a method consists in the addition to the electrolyte of a small quantity of M_2S. A number of null solutions were found, including one which gave results identical with those obtained by Palmaer.—An experimental examination of Gibbs's theory of surface concentration regarded as the basis of adsorption, and its application to the theory of dyeing: W. C. M. **Lewis.** An experimental investigation of Gibbs's theory of surface concentration. A particular form of the more general equation is

$$\Gamma = \frac{-c}{RT}\frac{d\sigma}{dc},$$

where Γ = the excess mass of solute per sq. cm. surface, c = the bulk concentration of the solution, T = the absolute temperature, R = the gas constant, and σ = the surface-tension. Assuming surface-tension effects to be the basis of adsorption, measurements were made of the quantities above. The material at the surface of which adsorption took place consisted of a pure hydrocarbon oil. The material adsorbed was bile-salt in aqueous solution. The interfacial tension σ was measured by the drop-pipette method. Γ was measured in two ways:—(1) at the surface of oil-drops of radius about 1 mm., and (2) at the surface of drops of radius about 10^{-4} mm., i.e. emulsion particles. The general result was that the actual values found for Γ exceeded the calculated by about fifty times the latter, the conclusion being that there is a discrepancy of considerable magnitude.

Zoological Society, March 3.—Mr. G. A. Boulenger, F.R.S., vice-president, in the chair.—A young female Kordofan giraffe: P. C. **Mitchell.** The author compared the coloration of this specimen, born at the gardens, with that of its parents and with that of a young female giraffe from Nigeria, now living in the society's collection, and stated that the evidence to be derived from the study of this specimen strengthened the case for the distinctness of the giraffes from Kordofan and Nigeria.—A comparison of the neotropical species of Corallus, *C. cookii* with *C. madagascariensis*, and on some points in the anatomy of *Corallus caninus*: F. E. **Beddard.**—A new species of monkey of the genus Cercopithecus: R. I. **Pocock.** The species differs from *C. neglectus* principally in the absence of the black band across the head, in the reddish tinge of the hairs beneath the callosities, and in the similarity in colouring between the tail and the body. It is proposed to name this new monkey *Cercopithecus ezrae*.

Entomological Society, March 4.—Mr. C. O. Waterhouse, president, in the chair.—*Exhibits.*—F. B. **Jennings**: (a) A specimen of the weevil *Phyllobius maculicornis*, Germ., retaining both the "false" mandibles, and another in which one of them is intact, both from Enfield, also a single example of *P. urticae*, De G., from Cheshunt, retaining one of these mandibles, the particular point of interest in connection with the false mandibles in these species being that they are toothed in the centre; (b) a remarkable specimen of the common Chrysomelid beetle, *Sermyla halensis*, L., from Deal, showing unusual coloration of the elytra, which are blue and coppery-red instead of bright green; and (c), on behalf of Mr. C. J. Pool, a specimen of *Otiorrhynchus tenebricosus*, Herbst, from Newport, I.W., and of *Barynotus obscurus*, F., from Galway, Ireland, in the first of which both the pupal mandibles were toothed, and in the second not.—H. St. J. **Donisthorpe**: *Otiorrhynchus sulcatus, Polydrusus sericeus,* and *Osmius bohemanni* with pupal mandibles. The Otiorrhynchus was dug up in its pupal cell at Oakham in 1895.—The Rev. G. **Wheeler**: A case containing specimens of Melitæid butterflies taken by him at Reazzino in Tessin, near Bellinzona, which he had identified with

Assmann's *Melitaea aurelia*, var. *britomartis*, they being absolutely identical with the specimens so labelled in the Swiss national collections at Berne. The close affinity on the underside with *M. dictynna* made separation superficially very difficult, and until all forms were reared from the ovum it would be impossible to determine whether *britomartis* constituted a separate species or not.—*Papers.*—Descriptions of new species of Lepidoptera-Heterocera from the south-east of Brazil : H. D. **Jones.**—*Erebia lefebvrei* and *Lycaena pyrenaica* : Dr. T. A. **Chapman.**—A contribution to the classification of the coleopterous family Dynastidæ : G. J. **Arrow.**—Hymenoptera-Aculeata collected in Algeria by the Rev. A. E. Eaton and the Rev. F. D. Morice, part iii., Anthophila : E. **Saunders.**

Royal Meteorological Society, March 11. — Dr. H. R. Mill, president, in the chair.—The dawn of meteorology : Dr. G. **Hellmann.** Some of the modern weather proverbs can be traced back to Indo-Germanic and Babylonian sources. Some of the tablets excavated from old Babylon contain references to the weather. Speaking of the names of the winds and their combinations, Dr. Hellmann said that the cardinal points, north, east, south, west, were found in old Babylonian times. The Greeks were the first to make meteorological observations, and had parapegmata or weather almanacks fixed on public columns. The measurement of rain was first recorded in Palestine. After referring to the first idea of the thermoscope, the lecturer alluded to the meteorology of Aristotle, and said that it had very little influence on English meteorologists. It was the fathers of the Church who kept meteorology alive, for in their works on the Creation they devoted much attention to the atmosphere. The writings of the Venerable Bede were also referred to. The resuscitation of experimental science in the thirteenth century led to the development of regular meteorological observations in the fourteenth century. The earliest known record in this country was kept by the Rev. William Merle at Oxford from January, 1337, to January, 1344, the manuscript of which is still in the Bodleian library.

Mathematical Society, March 12.—Prof. W. Burnside, president, in the chair.—The projective geometry of some covariants of a binary quintic : Prof. E. B. **Elliott.** The roots of the quintic being represented by points on a conic, ruler constructions, depending only on symmetric functions of the roots, and not on the roots individually, are given for those linear covariants which are of degrees 5 and 7 in the coefficients, and for the quadratic covariant which is of degree 2 in the coefficients. Constructions are also obtained for the linear covariants of degrees 11 and 13 in cases where the roots of the quintic are known individually. It appears that sets of four linear covariants and three quadratic covariants can be arranged as a quadrangle on a conic and the pairs of points in which the conic is met by the sides of the harmonic triangle of the quadrangle, but that two members of such sets of seven covariants are reducible to simpler members of a complete system.—The inequalities connecting the double and repeated upper and lower integrals of a function of two variables : Dr. W. H. **Young.** Difficulties arise in the theory of integration of a function which may become infinite, especially as to the possibility of replacing a double integral of such a function by a repeated integral. The paper contains a systematic investigation of such cases, and conditions are obtained which are sufficient to secure that the double integral can be evaluated as a repeated integral.—The operational expression of Taylor's theorem : Dr. W. F. **Sheppard.** Cases arise in which it is desired to express $f(x+y)$ in a form depending on $f(x)$, some differential coefficients of $f(x)$, and some differential coefficients of $f(x+y)$. Operational formulæ are obtained for such cases, and the remainders discussed.—Note on a soluble dynamical problem : Prof. L. J. **Rogers.** The problem is of a general type which includes Jacobi's problem of the attraction of a body to two fixed centres and various problems appropriately expressed in terms of elliptic coordinates.—A formula for the sum of a finite number of terms of the hypergeometric series when the fourth element is unity (second paper): Prof. M. J. M. **Hill.** The formula previously obtained by the author was

proved to hold for the sum of s terms of the series $F(\alpha, \beta, \gamma, 1)$, provided $\gamma-\alpha-\beta$ is not zero or a negative integer. It is now proved to hold in the case of the negative integer, and the appropriate modification is obtained in the case of the zero value.

Royal Astronomical Society, March 13.—Mr. H. F. Newall, F.R.S., president, in the chair.—A suggested explanation of the ancient Jewish calendar dates in the Aramaic papyri, translated by Prof. A. H. Sayce and Mr. A. E. Cowley: E. B. **Knobel.** The papyri are business documents relating to a Hebrew colony in Syene, and date from B.C. 471 to 410; they have duplicate dates, according to the Egyptian and Jewish reckoning, and are thus of unique importance for the elucidation of the ancient Jewish calendar, about which very little has hitherto been known. The Egyptian year and chronology are perfectly well understood. The period of the documents is extended by a Babylonian record of the eclipse of B.C. 523, translated by Father Strassmaier, in which the Jewish date is also given, and from these data a calendar has been constructed.—Double-star observations, 1902–7 : W. H. **Maw.** The author described his method of measuring the position angle of a bright star and faint companion. The wire was set near the bright star, at right angles to the line joining the two stars; it was then found easy to estimate a perpendicular to the wire.—Investigations on the distribution and motions of stars : F. W. **Dyson.** The conclusions of Prof. Kapteyn and Mr. Eddington as to two drifts of stars were confirmed, and the same result found from stars in the southern hemisphere.—The variability of the nucleus of the planetary nebula N.G.C. 7662 : E. E. **Barnard.** A drawing made with the Yerkes telescope showed the nebula as a broad ring with a dark space in the centre, in which was a star-like nucleus. From Prof. Barnard's observations of the variability of this nucleus Prof. Turner deduced a period of 27½ days. —Note on the discovery of a moving faint object near Jupiter : **Royal Observatory, Greenwich.** The object had been detected by Mr. Melotte on several plates taken for Jupiter's sixth and seventh satellites. It was not yet certain whether it is a new satellite or a minor planet moving very near Jupiter, but in either case it appeared of much interest.—The relative number of star images photographed in different parts of the plates for the Oxford portion of the Astrographic Catalogue : H. H. **Turner.** —The perturbations of Halley's comet, 1759–1900 : P. H. **Cowell** and A. C. D. **Crommelin.** Further investigations indicated that Pontécoulant's date for the perihelion passage in 1910 was somewhat too late; the most probable date is April 8.—The perturbations of Halley's comet in the past. Third paper, the period 1066–1301 : P. H. **Cowell** and A. C. D. **Crommelin.** Four returns of the comet from 1066–1301 now appeared to be well identified from Chinese and European observations. It had been found that a satisfactory identification of the return of 1222 was obtained by accepting the Chinese observations as they stood, and making a change in the interpretation of the Western records.

CAMBRIDGE.

Philosophical Society, February 24. —Mr. D. Sharp, vice-president, in the chair.—Relation between the geographical distribution and the classification of the Onychophora : Prof. **Sedgwick.** The Onychophora comprise the single genus Peripatus, which was discovered in St. Vincent in the Antilles in 1826. Later, specimens of it were obtained from South Africa and Australasia, and its arthropodan nature was established by Moseley in 1874. In 1888 it was shown by the author of the present communication that the species of it fell into discontinuous groups, all capable of precise definition. At present seven such groups are known, each occurring in a definite geographical area. The geographical groups, together with the names which have been applied to them by the author, are as follows :—
(1) Neo-Peripatus from the neotropical region as far south as Rio de Janeiro; (2) Congo-Peripatus from the Congo district in Africa; (3) Eo-Peripatus from Malaya (Malacca and Sumatra); (4) Capo-Peripatus from South Africa (Natal to Cape Town); (5) Melano-Peripatus from New Britain; (6) Austro-Peripatus from Australia, Tasmania,

and New Zealand; (7) Chilio-Peripatus from Chili. The author showed (1) that these geographical groups of species are natural zoological groups, the members of which are more closely allied to each other than to those of the other groups; (2) that the distinguishing specific characters are distributed in an entirely haphazard manner among the different specific groups, so that it is quite impossible to show their phylogenetic affinities by any tree-like arrangement.—The method of impregnation in Peripatus: Prof. **Sedgwick**.—Exhibition and description of Welwitschia collected by Prof. Pearson: Prof. **Seward**.—Note on a method of demonstrating the syncytial appendages of the placental villi: Dr. **Duckworth**. The placenta provides material for a ready and quick method of demonstrating the appearance of multicellular or syncytial masses of protoplasm. Small portions of the placenta are stained in bulk, and the syncytial appendages can be easily shown by teazing out the villous processes from whence they spring. —Six new species of the Ixodoidea: W. F. **Cooper** and L. E. **Robinson**.—Note on the protozoan intestinal parasites of frogs and toads: C. C. **Dobell**.

EDINBURGH.

Royal Society, March 2.—Dr. John Horne, F.R.S., vice-president, in the chair.—A preliminary notice of new iron-bacteria: Dr. D. **Ellis**. Five new forms were described, four being new species and one—*Notofolium ferrugineum*—a new genus. They had all been discovered in the iron waters of Scotland. The methods of reproduction were the same in all, namely, a process of conidia formation, and also by transverse splitting of individuals.—The effect of load and vibrations upon magnetism in nickel; supplementary communication: James **Russell**. In determining the effect of off-and-on load the two important factors were the position on the loop and the intensity of the vibrations. In particular, the conditions under which the Villari reversal shows in nickel were studied and described. --A simplified calendar: Alex. **Philip**. The aim of the author was to establish a perpetual calendar by arranging so that any particular day of the month would be the same day of the week. This was accomplished by making New Year's Day a day apart, not to be reckoned in the months or weeks. January would begin on what is now the second. There would be exactly fifty-two weeks of seven days, and by a slight re-arrangement four quarters of three months of ninety-one days in all. The proposed system did not interfere in any way with astronomical principles, the odd day in Leap Year to be treated like New Year's Day, as a midsummer holiday between June and July. So far as the author knew, it violated no scientific principle.

PARIS.

Academy of Sciences. March 9.—M. H. Becquerel in the chair.—The neutral alkaline and alkaline earth carbonates: M. **de Forcrand**. A re-calculation, with some new experimental data, of the whole of the thermo-chemical data relating to the carbonates of sodium, potassium, rubidium, cæsium, lithium, calcium, strontium, and barium. The bearing of these results upon the temperatures of dissociation of these carbonates is also discussed.—The Ordovician iron minerals of Lower Normandy and Maine: M. **Œhlert**.—New researches on variable stars: Charles **Nordmann**. The amplitude and form of the luminous variation of the two variable stars studied differ markedly according to the part of the visible spectrum compared.—A hyperelliptic surface of the fourth degree upon which are traced thirty right lines: E. **Traynard**.—Problems of elasticity in two dimensions: G. **Kolossoff**.—A case of reduction of the differential equations of the trajectory of an electrified corpuscle in a magnetic field: Carl **Störmer**.—The increase in the sensitiveness of electrolytic detectors under various influences: Edouard **Branly**. The effects produced by a rise of temperature, mechanical agitation, and gaseous disengagement in the electrolyte are separately discussed. —The theory of Brownian motion: P. **Langevin**. A simplified proof of Einstein's formula is given, and this is shown to be identical with the formula of Smoluchowski. —Singing flames reinforcing several notes: G. **Athan-**

asiadis.—A spectrophotometric arrangement: J. **Thovert**. —The action of alkaline salts with fixed base on the combustion of gases and fixed combustibles: M. **Dautriche**. The effect produced on the heat evolved by several nitro explosives by the addition of alkaline salts was studied, with especial reference to the safe use of these explosives in fiery mines. The salts of the alkaline earths, according to these experiments, appear to prevent the combustion of the carbon monoxide formed by the detonation, and thus add to the safety of the explosive.— Combustion without flame and the inflammation of gases at the extremity of a metallic tube: Jean **Meunier**.—The composition of the starch grain: Mme. Z. **Gatin-Gruzewska**. A method is given for separating the amylopectin and amylose by means of dilute alkali and subsequent neutralisation with acetic acid.—Observations on the preceding note: L. **Maquenne**.—The duration of the peroxydiastases in seeds: MM. **Brocq-Rousseu** and Edmond **Gain**. Seeds varying in age from two to upwards of 2000 years were examined for the presence of peroxydiastases. These ferments may disappear in seeds only twenty years old; two exceptional cases were found in which seeds more than 200 years old still gave the reaction for peroxydiastase.—The metamorphism and tectonic of the Palæozoic strata of Morvan and the Loire: Albert **Michel-Lévy**.—The eruptions of the Limagne. Seven periods of volcanic activity from the Lower Miocene to the Pleistocene: Ph. **Glangeaud**.—Observation of a case of ball lightning: Isidore **Bay**. This was observed on May 26, 1907, at Saint Georges-de-Reneins. An incandescent ball was seen, lasting five minutes. On its disappearance the disruptive effects of ordinary lightning were observed.

GÖTTINGEN.

Royal Society of Sciences.—The *Nachrichten* (mathematico-physical section), part v. for 1907, contains the following memoirs contributed to the society:—

July 20.—Difference-formulæ for the calculation of optical systems: K. **Schwarzschild**.

October 26.—Contributions to the theory of atmospheric electricity: E. **Riecke**.

November 23.—The potential gradient in the positive glow, from observations by H. Schwienhorst: E. **Riecke**. —Comparison of the magnitudes of horizontal magnetic intensity at Potsdam and Cheltenham in the year 1904: F. **Linke**.—A calculation of the wave-length of the Röntgen rays from Planck's "energy-element": W. **Wien**.— Langbeinite $(K_2SO_4.2MgSO_4)$ and vanthoffite

$$(3Na_2SO_4.MgSO_4):$$

R. **Nacken**.—The uniformisation of given analytical curves (ii.): P. **Koebe**.

December 7.—The nature and age of the geological displacements in the neighbourhood of the Sackberg and in the valley of the Leine at Alfeld and Elze: A. **von Koenen**.—The proper motions of the fixed stars: K. **Schwarzschild**.

December 21.—An application of the theory of invariants to the development in series of integrals, particularly rational, elliptic, and hyperelliptic: W. F. **Meyer**.

The business communications (part ii., 1907) of the same society include a report by K. **Schwarzschild** on Lambert's letters on cosmology.

NEW SOUTH WALES.

Royal Society, December 4, 1907.—Mr. H Deane, president, in the chair.—The effect of Polar ice on the weather: E. **Du Faur**. The author urged the necessity for frequent accurate observations on the varying position of Antarctic ice, at points within easy access of Hobart, on account of its influence upon southern climate. Provision should be made for frequent, even annual, observations to be taken for the future in the Victoria quadrant.—A comparison of the rainfall of Sydney and Melbourne, 1876 to 1905: A. **Duckworth**. The average rainfall of Sydney is given as 47.36 inches, and that of Melbourne as 24.92 inches. In Sydney, the year 1888 was the driest and 1890 the wettest, whilst in Melbourne 1898 was the driest and 1887 the wettest. If we were to judge solely from the amount of the annual rainfall of Sydney, without regard

to its periodical distribution and the intensity of its precipitation, it might be said there was no actual period of serious drought, the rainfall of Sydney being below the average of Melbourne only in the exceptional year 1888. The divergencies in the rainfall of these two great cities were so striking as to tend to make one careful in formulating any conclusions based on the rainfall experience of either city taken alone.—The Australian Melaleucas and their essential oils, part ii. : R. T. **Baker** and H. G. **Smith.** This section (part ii.) of the subject covers an investigation of the two species, *Melaleuca uncinata*, R. Br., and *Melaleuca nodosa*, Sm, The former is restricted more particularly to the interior of the continent, not having been recorded east of the dividing range. It does, however, occur on Kangaroo Island. It is mostly a slender shrub having acicular leaves terminating with slender hooks. *M. nodosa* is a coastal plant, and is a more compact shrub.—Aboriginal navigation and other notes : R. H. **Mathews.**—A short volumetric method for the estimation of sulphuric acid : Dr. T. **Cooksey.** The method depends upon the volumetric estimation of the excess of barium salt left in solution after the precipitation of the sulphuric acid as sulphate of baryta. The barium is estimated by standard carbonate of soda—phenolphthalein being used as indicator. Spirit of wine is added to promote the rapid precipitation of the barium carbonate.

DIARY OF SOCIETIES.

THURSDAY, MARCH 19.

ROYAL SOCIETY, at 4.30.—On Vapour-pressure and Osmotic Pressure of Strong Solutions : Prof. H. L. Callendar, F.R.S.—On Secondary β-Rays : Prof. J. A. McClelland.—On the Measurement of the Atmospheric Electric Potential Gradient and the Earth-air Current : C. T. R. Wilson, F.R.S. —Note on the Trajectories of Rifled Projectiles with Various Shapes of Head : A. Mallock, F.R.S.

ROYAL INSTITUTION, at 3.—Standardisation in Various Aspects : (1) Mechanical Engineering : Dr. R. T. Glazebrook, F.R.S.

ROYAL SOCIETY OF ARTS, at 8.—The Navigation of the Air : Dr. H. S. Hele-Shaw, F.R.S.

CHEMICAL SOCIETY, at 8.30.—The Constitution of Electronegative "Thiocyanates": A. E. Dixon and J. Taylor.—An Improved Form of Pyknometer : W. R. Bousfield.—The Quantitative Conversion of Aromatic Hydrazines into Diazonium Salts : F. D. Chattaway.—The Action of Heat on α-Hydroxycarboxylic Acids, Part iv., Racemic αα-Dihydroxyadipic Acid and Meso αα-Dihydroxyadipic Acid : H. R. Le Sueur.—The Spontaneous Crystallisation of Sodium Sulphate Solutions : H. Hartley, B. M. Jones, and G. A. Hutchinson.—Quantitative Relations of Salts of Thallium and its Separation from Silver : J. F. Spencer and Miss M. Le Pla.—Constitution of Hydroxyazo Compounds, Action of Diazomethane and of Mercuric Acetate : C. Smith and A. D. Mitchell.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—New Alternate Current Instruments : Dr. W. E. Sumpner and J. W. Record.

LINNEAN SOCIETY, at 8.—The Podosomata of the Atlantic and the Arctic Oceans : Rev. Canon Norman, F.R.S.—A Revision of the Genus Codonopsis : T. F. Chipp.—On the Holothurians from the Red Sea : E. Hindle.

INSTITUTION OF MINING AND METALLURGY, at 8.—Annual General Meeting.

FRIDAY, MARCH 20.

ROYAL INSTITUTION, at 9.—Recent Earthquakes : Prof. J. Milne, F.R.S.

INSTITUTION OF CIVIL ENGINEERS, at 8.—Stresses in Brick Arches : J. D. W. Ball.

SATURDAY, MARCH 21.

ROYAL INSTITUTION, at 3.—Electric Discharges through Gases : Prof. J. J. Thomson, F.R.S.

MONDAY, MARCH 23.

ROYAL SOCIETY OF ARTS, at 8.—Fuel and its Future : Prof. V. B. Lewes.

SOCIOLOGICAL SOCIETY, at 8.—The Definition of Magic : Principal Jevons.

TUESDAY, MARCH 24.

ROYAL INSTITUTION, at 3.—The Egyptian Sudan : its History, Monuments, and Peoples, Past and Present : Dr. E. A. Wallis Budge.

ROYAL SOCIETY OF ARTS, at 4.30.—The Mineral Resources of Western Australia : Hon. C. H. Rason.

FARADAY SOCIETY, at 8.—Presidential Address : Some Aspects of the Work of Lord Kelvin : Sir Oliver Lodge, F.R.S.

ROYAL ANTHROPOLOGICAL INSTITUTE, at 8.15.—(1) Sinhalese Magic, with Especial Reference to Charming Ceremonies and Amulets ; (2) Exhibition of Amulets, Objects employed by Devil Dancers and Buddhist Votive Offerings : Dr. W. L. Hildburgh.

INSTITUTION OF CIVIL ENGINEERS, at 8.—The Curzon Bridge, at Allahabad : R. R. Gales.—The Netravati Bridge, at Mangalore : A. S. Napier.

WEDNESDAY, MARCH 25.

ROYAL SOCIETY OF ARTS, at 8.—Recent Improvements in Decorators Materials : A. S. Jennings.

BRITISH ASTRONOMICAL ASSOCIATION, at 5.

THURSDAY, MARCH 26.

ROYAL SOCIETY, at 4.30.—*Probable Papers* :—Bakerian Lecture : The Thermal Conductivities of Solids : Prof. C. H. Lees, F.R.S.—Comparison of the Board of Trade Ampere-Standard Balance and the British Association (Ayrton-Jones) Current Weigher : T. Mather, F.R.S., and F. E. Smith.—Note on the Rise of Meteorological Balloons and the Temperature of the Upper Air : A. Mallock, F.R.S.

ROYAL SOCIETY OF ARTS, at 8.—The Navigation of the Air : Dr. H. S. Hele-Shaw, F.R.S.

ROYAL INSTITUTION, at 3.—Standardisation in Various Aspects : (2) Electrical Engineering : Dr. R. T. Glazebrook, F.R.S.

CHEMICAL SOCIETY, at 5.—Annual General Meeting.—Presidential Address : The Electron as an Element : Sir William Ramsay, K.C.B., F.R.S.

FRIDAY, MARCH 27.

ROYAL INSTITUTION, at 9.—Radio-active Change in the Earth : the Hon. R. J. Strutt, F.R.S.

PHYSICAL SOCIETY, at 5.—(1) Notes on the Plug Permeameter ; (2) On the Use of Shunts and Transformers with Alternate Current Measuring Instruments ; (3) On Wattmeters ; Dr. C. V. Drysdale.

INSTITUTION OF MECHANICAL ENGINEERS, at 8.—Combustion Processes in English Locomotive Fire-Boxes : Dr. F. J. Brislee.—Combustion Processes in American Locomotive Fire-Boxes : L. H. Fry.

SATURDAY, MARCH 28.

ROYAL INSTITUTION, at 3.—Electric Discharges through Gases : Prof. J. J. Thomson, F.R.S.

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